REMARKS

Claims 50-115 have been renumbered to 47-112 as requested by the Examiner.

Renumbered claims are amended to correct the claim dependencies.

The Examiner rejected claims 1-6, 8, 10, 11, 14, 17-25, 27, 38, 40-52, 54, 56, 57, 60, 63-71, 73, 83, 85-87, 89, 90, 92-94, 97, 98, 103 and 104 as being anticipated by Kurematsu, U.S. Patent No. 5,153,752.

All of the embodiments disclosed by Kurematsu et al., include a white light source 20 producing generally randomly polarized light. The projector of Kurematsu et al., is designed in a manner that may receive randomly polarized light, such as the light received by the polarizing beam splitter 21 (FIG. 2). Accordingly, the projector does not require and thus does not disclose a "polarization converter" for use with a light source.

The Examiner apparently considers part of the optics array of Kurematsu et al. to be a "polarization converter" for the projection system, in which the polarization converter is the two polarizing beam splitters 21 and 23. The output of the polarizing beam splitter 21 is a light beam S_1 of S polarized white light. The output of the polarizing beam splitter 23 is a light beam S_2 of S polarized white light. In no case do the polarizing beam splitters (that is, the polarization converter) provide polarized light having more than one polarization state. Further, each of the projection systems is designed to receive such uniformly polarized light as the input thereof.

Claim 1 patentably distinguishes over Kurematsu et al., by claiming a polarization converter for use with a light source that generates a light beam having at least two light components, comprising an optics array capable of separating the light beam into at least one light component polarized **differently** than another light component, wherein the one light component

has a different color than the another light component. The output of the polarization converter, as postulated of Kurematsu et al., provides white light beams where all of the light components are polarized the **same**, namely, either all P polarized or all S polarized.

Claims 2-19 depend from claim1, either directly or indirectly, and are patentable for the same reasons asserted for claim 1.

Claim 20 patentably distinguishes over Kurematsu et al., by claiming a method of projecting light comprising producing a light beam that is nonpolarized and has at least two light components. The light beam is separated into at least one light component polarized differently than another light component, wherein substantially all of the light beam is transmitted, wherein the one light component has a different color than the another light component. The light beam as a result of step (b) is received and light-component-specific images are provided. The light-component-specific images are projected through a projection lens.

Claims 21-24 depend from claim 1, either directly or indirectly, and are patentable for the same reasons asserted for claim 20.

Claims 25 and 38 patentably distinguishes over Kurematsu et al., by claiming a projection system with a light source for generating a light beam having at least two light components, wherein the light components are polarized and at least one of the light components is polarized differently than another of the light components, wherein the one light component has a different color than the another light component. Claim 25 likewise claims a projection system and a projection lens.

Claims 26-31 depend from claim 25, either directly or indirectly, and are patentable for the same reasons asserted for claim 25. Claims 39-46 depend from claim 38, either directly or indirectly, and are patentable for the same reasons asserted for claim 38.

Claim 47 patentably distinguishes over Kurematsu et al., by claiming a projection display system using polarized light comprising a polarization converter for use with a light source that provides a light beam having at least two light components where at least one light component is polarized **differently** than another light component, wherein the one light component has a different color than the another light component. A projection system receives the differently polarized light and provides light-component-specific images. A projection lens projects an image combined from the light-component-specific images.

Claims 48-65 depend from claim 47, either directly or indirectly, and are patentable for the same reasons asserted for claim 47.

Claim 66 patentably distinguishes over Kurematsu et al., by claiming a method for converting light comprising producing a light beam of generally white light that is nonpolarized and has at least two light components. The generally white light beam is separated into at least one light component polarized differently than another light component, wherein substantially all of the generally white light beam is transmitted as a single beam, wherein the one light component has a different color than the another light component. The single beam is separated into at least two light beams, where the first beam includes light having a first polarization and the second beam includes light having a second polarization, and providing light-component-specific images.

Claims 67-70 depend from claim 66, either directly or indirectly, and are patentable for the same reasons asserted for claim 66.

Claim 71 patentably distinguishes over Kurematsu et al., by claiming a projection display system using polarized light comprising a light source for generating a generally white light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components, and said at least two components are provided to a projection system as a single beam, wherein the one light component has a different color than the another light component.

Claims 72-87 depend from claim 71, either directly or indirectly, and are patentable for the same reasons asserted for claim 71.

Claim 83 patentably distinguishes over Kurematsu et al., by claiming a projection display system using polarized light, comprising a light source for generating a generally white light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components, and the one light component has a different color than another light component.

Claims 84-94 depend from claim 83, either directly or indirectly, and are patentable for the same reasons asserted for claim 83.

Claim 97 patentably distinguishes over Kurematsu et al., by claiming, in relevant part, that the one light component has a different color than the another light component.

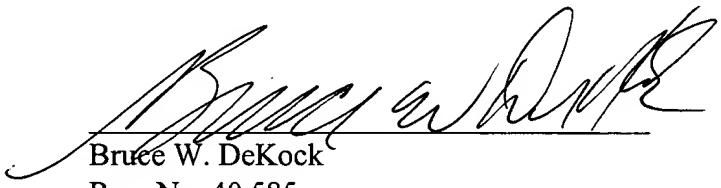
Claims 98-102 depend from claim 97, either directly or indirectly, and are patentable for the same reasons asserted for claim 97.

Claim 103 patentably distinguishes over Kurematsu et al., by claiming, in relevant part, that the one light component has a color that is different than another light component.

Claim 104 depends from claim 103 directly and is patentable for the same reasons asserted for claim 103.

The Examiner is respectfully requested to reconsider the claims, in light of the foregoing amendments and remarks, and to pass claims 1-112 to issue.

Respectfully submitted,



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APPENDIX

In the Claims:

–1. (Amended Twice). A polarization converter for use with a light source that generates a light beam having at least two light components, comprising an optics array capable of separating said light beam into at least one light component polarized differently than another light component, wherein said one light component and said another light component are within a single said light beam, and wherein said one light component has a different color than said another light component.

--20. (Amended Three times). A method of projecting light comprising:

(a) producing a light beam that is nonpolarized and has at least two light components;

(b) separating said light beam into at least one light component polarized differently than another light component, wherein substantially all of said light beam is transmitted, wherein said one light component and said another light component are within a single said light beam, and wherein said one light component has a different color than said another light component;

(c) receiving said light beam as a result of step (b) and providing light-component-specific images; and

(d) projecting said light-component-specific images through a projection lens.

--25(Amended Once). A projection display system using polarized light comprising:

(a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components and said one of said light components has a color that is different than said another of said light components;

(b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD panel generating a light-component-specific image associated with one of said light components; and

(c) a projection lens for projecting an image combined from the light-component-specific images from the LCD's.

--38(Amended Once). A projection display system using polarized light, comprising:

(a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components and said one of said light components has a color that is different than said another of said light components;

(b) a projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components; and

(c) a projection lens for projecting an image combined from the light-component-specific images from said modulators.

--47 (Amended Twice). A projection display system using polarized light comprising:

(a) a polarization converter for use with a light source that provides a light beam having at least two light components where at least one light component is polarized differently than another light component, wherein said one light component and said another light component are within a single said light beam, and wherein said one light component has a different color than said another light component;

(b) a projection system that receives said differently polarized light and provides light-component-specific images; and

(c) a projection lens that projects an image combined from the light-component-specific images.

--48(Amended once). The system of claim 47 [50] wherein said light source defines an initial étendue and said polarization converter has an étendue no more than four times greater than said initial étendue.

--49(Amended once). The system of claim 48 [51] wherein said polarization converter

has an étendue no more than 3.5 times greater than said initial étendue.

--50(Amended once). The system of claim 48 [51] wherein said polarization converter has an étendue no more than two times greater than said initial étendue.

--51(Amended once). The system of claim 47 [50] wherein said polarization converter has at least one dichroic filter.

--52(Amended once). The system of claim 47 [50] wherein substantially all of said light beam is transmitted through said polarization converter.

--53(Amended once). The system of claim 51 [54] wherein said dichroic filter is sandwiched between two quarter waveplates.

--54(Amended once). The system of claim 47 [50] wherein said polarization converter has a first dichroic filter and a second dichroic filter complimentary to said first dichroic filter.

--55(Amended once). The system of claim 54 [57] wherein each dichroic filter is sandwiched between two quarter waveplates.

--56(Amended once). The system of claim 54 [57] wherein said polarization converter includes a polarizing beam splitter and said light beam passes through said beam splitter before

passing through one of said dichroic filters.

--57(Amended once). The system of claim 56 [59]wherein said polarization converter further includes another polarizing beam splitter.

--58(Amended once). The system of claim 55 [58] wherein said polarization converter further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

--59(Amended once). The system of claim 58 [61] wherein said polarization converter further includes a halfwave plate between one of said polarizing beam splitters and an illuminated object.

--60(Amended once). The system of claim 47, [50] further comprising a plurality of light input ports.

--61(Amended once). The system of claim 55 [58] wherein said polarization converter further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

--62(Amended once). The system of claim 55 [58] wherein said polarization converter

further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said polarization converter further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter wave plate and mirror stacks.

--63(Amended once). The system of claim 47 [50] wherein said light source produces light having three light components and said polarization converter separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

--64(Amended once). The system of claim 63 [66] wherein said three light components are blue, green, and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

--65(Amended once). The system of claim 47 [50] wherein said polarization converter separates said two light components so that one of said components has s-polarization and the other light component has p-polarization.

--66 (Amended Twice). A method for converting light comprising:

(a) producing a light beam of generally white light that is nonpolarized and has at least two light components;

(b) separating said generally white light beam into at least one light component polarized differently than another light component, wherein substantially all of said generally white light beam is transmitted as a single beam, wherein said one light component and said another light component are within a single said light beam, and said one light component has a different color than said another light component; and

(c) separating said single beam into at least two light beams, where the first beam includes light having a first polarization and the second beam includes light having a second polarization, and providing light-component-specific images.

--67(Amended once). The method of claim 66 [69] wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization.

--68(Amended once). The method of claim 67 [70], further comprising the step of separating the first polarized component into a first light component and a second light component and changing the polarization of the first light component, and the step of separating the second polarized component spectrally into said first light component and said second light component and changing the polarization of the second light component, so that said first light

component has said second polarization, and said second light component has said first polarization.

--69(Amended once). The method of claim 66 [69]wherein said light beam is comprised of a red component, a blue component and a green component, and said light is separated so that said blue component and said green component have the same polarization, which is different than the polarization of said red component.

--70(Amended once). The method of claim 66 [69] wherein said light beam is separated so that one of said light components has s-polarization and the other light component has p-polarization.

--71 (Amended Twice). A projection display system using polarized light comprising:

(a) a light source for generating a generally white light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components, and said at least two components are provided to a projection system as a single beam, wherein the one light component and the another light component are within a single the light beam, and said one light component has a different color than said another light component;

(b) said projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD panel generating a light-component-specific image associated with one of said light components; and

(c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs.

--72(Amended once). The system of claim 71 [74] wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

--73(Amended once). The system of claim 71 [74] wherein said light source includes a polarization converter for pre-filtering said light beam.

--74(Amended once). The system of claim 71 [74] wherein said polarizing beam splitters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent a mid-point of said substantially straight lines.

--75(Amended once). The system of claim 74 [77] wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

--76(Amended once). The system of claim 74 [77] wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

--77(Amended once). The system of claim 71 [74] wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system for pre-filtering said light beam to provide a red p-polarized light component to said projection system, wherein said pre-filtering illuminating mechanism includes:

a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light

absorbing stops, a half-wave plate, and a red-reflecting dichroic filter;

wherein said light beam impinges said red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light and blue light components; said reflected green and blue light components impinge on a polarizing beam splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s-polarized light component and a blue s-polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which red p-polarized light component impinges sand red-reflecting dichroic filter and is reflected to said projection system.

--79(Amended once). The system of claim 78 [81] wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam.

--80(Amended once). The system of claim 78 [81]wherein said light source includes a polarization converter for pre-filtering said light beam.

--81(Amended once). The system of claim 78 [81] wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then

impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

--82(Amended once). The system of claim 78 [81] wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

--83(Amended once). A projection display system using polarized light comprising:

(a) a light source for generating a generally white light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components, said one of said light components has a color that is different than said another of said light components and said at least two light components are provided to a projection system as a single beam;

(b) said projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components; and

(c) a projection lens for projecting an image combined from the light-component-specific images from said modulators.

--84(Amended once). The system of claim 83 [86] wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

--85(Amended once). The system of claim 83 [86] wherein said light source includes a polarization converter.

--86(Amended once). The system of claim 85 [88] wherein said polarization converter transmits substantially all of said light beam.

--87(Amended once). The system of claim 85 [88] wherein said light source has a lamp defining an initial étendue, and said polarization converter has an étendue no greater than twice said initial étendue.

--88(Amended once). The system of claim 85 [88] wherein said polarization converter

has a first dichroic filter and a second filter complimentary to said first dichroic filter, and wherein each dichroic filter is sandwiched between two quarter waveplates.

--89(Amended once). The system of claim 85 [88] wherein said polarization converter includes two polarizing beam splitters.

--90(Amended once). The system of claim 85 [88] wherein said polarization converter further comprises a plurality of light input ports.

--91(Amended once). The system of claim 88 [91] wherein said polarization converter further includes at least two polarizing beam splitters.

--92(Amended once). The system of claim 85 [88] wherein said light source produces light having three light components and said polarization converter separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

--93(Amended once). The system of claim 92 [95] wherein said three light components are blue, green and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

--94(Amended once). The system of claim 85 [88] wherein said polarization converter

separates said two light components so that one of said light components has s-polarization and another of said light components has p-polarization.

--97 (Amended twice). A polarization converter for use with a light source that generates a light beam having at least two light components, comprising an optics array capable of separating said light beam into at least one light component polarized differently than another light component, wherein said one light component and said another light component are within a single said light beam and said one light component has a different color than said another light component, wherein said optics array has a first dichroic filter and a second dichroic filter complimentary to said first dichroic filter, wherein said optics array includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

--98(Amended once). The converter of claim 97 [100] wherein said optics array further includes another polarizing beam splitter.

--99(Amended once). The converter of claim 96 [99] wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

--100(Amended once). The converter of claim 99 [102] wherein said optics array further includes a halfwave plate between one of said polarizing beam splitters and an illuminated

object.

--101(Amended once). The converter of claim 96 [99] wherein said optics array further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

--102(Amended once). The converter of claim 96 [99] wherein said optics array further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said optics array further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, and said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter wave plate and mirror stacks.

--103(Amended once). A method for converting light comprising:

(a) producing a light beam that is nonpolarized and has at least two light components;

(b) separating said light beam into at least one light component polarized differently than another light component said one light component having a color that is different than said another light component, wherein

substantially all of said light beam is transmitted; and

(c) wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization.

--104(Amended once). The method of claim 103 [107], further comprising the step of separating the first polarized component into a first light component and a second light component and changing the polarization of the first light component, and the step of separating the second polarized component spectrally into said first light component and said second light component and changing the polarization of the second light component, so that said first light component has said second polarization, and said second light component has said first polarization.

--107(Amended once). The system of claim 106 [109] wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

--108(Amended once). The system of claim 106 [109] wherein said light beam from said

light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

--112(Amended once). The system of claim 111 [114] wherein said polarization converter further includes at least two polarizing beam splitters.

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CERTIFICATE OF MAILING

I hereby certify that a Transmittal Form, Fee Transmittal 2002 (in duplicate), Request for Continued Examination Transmittal (RCE), Amendment (41pages) with certificate of mailing, Petition for Two Month Extension (in duplicate), Check in the amount of $3,960 and an acknowledgment postcard is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Box Fee Amendment, Commissioner for Patents, Washington, D.C. 20231.

Dated: March 22, 2002

Bruce W. DeKock